

LAKE COUNTY, ILLINOIS

2014 BLUFF LAKE SUMMARY REPORT

PREPARED BY THE ECOLOGICAL SERVICES
LAKE COUNTY HEALTH DEPARTMENT
POPULATION HEALTH ECOLOGICAL SERVICES



Bluff Lake

Bluff Lake is a glacially formed lake located in Antioch Township near the Village of Antioch. The lake has a surface area of 100.24 acres and a maximum depth of 28 feet and a mean depth of 10.5 feet. The Fox Waterway Agency, and the Illinois Department of Natural Resources (IDNR) actively manages the lake for boating, fishing, swimming, and aesthetics. Bluff Lake has also been a participant in the Illinois Environmental Protection Agency's (IEPA) Volunteer Lake Monitoring Program since 1999.

The Bluff Lake shoreline length is 2.75 miles, and is surrounded by residential development. Bluff Lake receives water primarily from the Lake Marie; water enters the lake from its approximately 943 acre watershed in Illinois. The water exits at Bluff Lake through a channel located on the south east side of the lake where it flows into Spring, Petite, Fox, Nippersink, and Pistakee Lake where it eventually reforms into the lower Fox River. During the spring thaw, the rising water will reverse its course and flow into Lake Bluff from Spring Lake. The primary land uses within the Bluff Lake watershed are single family homes and agriculture. Gas motors are permitted on the lake and multiple boat launches are located throughout the Fox Chain O' Lakes. The Chain O' Lakes State Park and Oak point has a free public launch ramp.

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LAKE FACTS**Major Watershed:**

Fox River

Sub-Watershed:

Upper Fox River

Surface Area:

100.24 acres

Shoreline Length:

2.75 miles

Maximum Depth:

28 feet

Average Depth:

10.5 feet

Lake Volume:

1340.67 acre-feet

Watershed Area:

943 acres (Illinois)

600,046 acres (Wisconsin)

Lake Type:

Impoundment

Current Uses: Fishing,
boating, swimming and
aesthetics

Water quality parameters, such as nutrients, suspended solids, oxygen, temperature, water clarity were measured from May-September 2014. The aquatic plant community was assessed in July when most of the plants are likely to be present.

Historically Bluff Lake has had a variety of lake quality issues including excessive aquatic plants, abundance of carp, severe algal blooms, sediment and nutrient enrichment. In general the 2014 water quality in Bluff Lake was poor due to the lack of aquatic plants, frequent algae blooms, and low dissolved oxygen. Total phosphorus in Bluff Lake averaged 0.112 mg/L which is a 53% increase from the 2002 concentration of 0.073 mg/L and higher than the Illinois Environmental Protection Agency impairment rate of 0.050 mg/L.

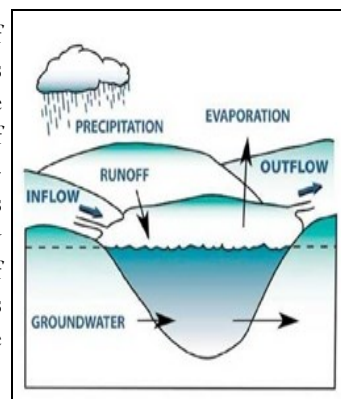
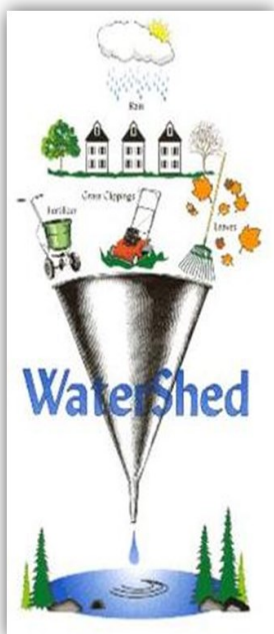
Nitrogen is the other nutrient critical for algal growth. The average Total Kjeldahl nitrogen (TKN) concentration for Bluff was 1.902 mg/L, which was higher than the county median of 1.200 mg/L. A total nitrogen to total phosphorus (TN:TP) ratio of 19:1 indicates that phosphorus was the nutrient limiting aquatic plant and algae growth in Bluff Lake. By using phosphorus as an indicator, the trophic state index (TSIp) ranked Bluff Lake as eutrophic with a TSIp value of 69.7. This means that the lake has high nutrients which can result in high plant density and algae growth. The 2014 average total suspended solids (TSS) concentration for Bluff Lake was 11.0 mg/L, which was higher than the county median 8.2 mg/L and a 10% increase from the 2002 average of 10.2 mg/L.

Water clarity was measured by Secchi depth, with the lowest reading in September (1.00 ft) and the deepest was in June (4.92 ft). The average Secchi depth for the season was 2.51 ft, which was shallower than the county median (2.95 ft). The average conductivity of Bluff Lake was 0.8381 mS/cm which is slightly higher than the county median (0.7900 mS/cm). This was a 13.7% increase from the 2002 average (0.7370 mS/cm). The average chloride concentration in Bluff Lake in 2014 was 116 mg/L which was lower than the county median of 139 mg/L.

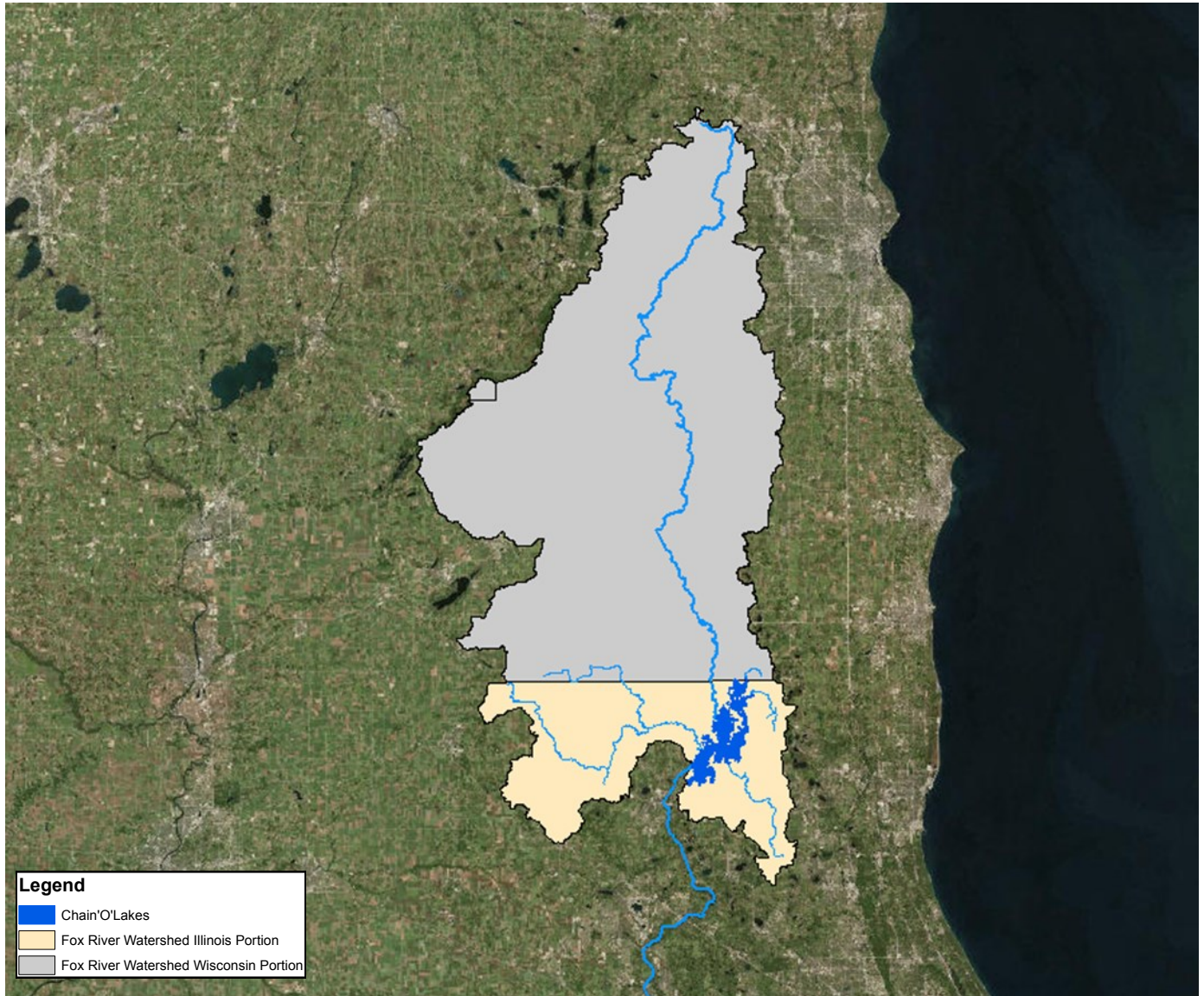
Bluff Lake does not have a diverse and healthy plant community, Eurasian Water Milfoil and Curly Leaf Pondweed were the dominant species occurring 14.8% and 8.3% of the 108 sites surveyed. Heavy boat traffic and carp activity are likely maintaining the high turbidity, that prevents aquatic plant growth.

BLUFF LAKE WATERSHED

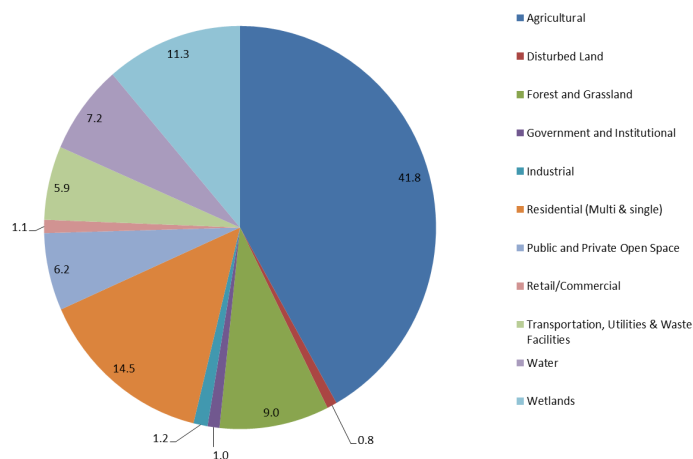
The lake is located in the Upper Fox River sub basin, within the Fox River watershed. A watershed is a drainage basin where water from rain or snow melt drains into a body of water, such as a river, lake, reservoir, wetland or storm drain. The Illinois portion of this watershed covers 943. The source of a lakes water supply is very important in determining its water quality and choosing management practices to protect the lake. Lakes like Bluff Lake that receive the majority of their water from streams often have variable water quality that is heavily influenced by human activity. Bluff Lake receives water from the Lake Marie. The watershed to lake surface area is extremely large and which contributes to a higher nutrient and sediment load. The Stratton Locke and Dam, located approximately 10 miles downstream, controls the flow and water level of Bluff Lake and the rest of the Fox Chain O' Lakes. The retention time, the time it takes for water entering a lake to flow out again was calculated to be approximately 4.9 days. The major sources of runoff for Bluff Lake were residential (29.5%), agriculture (18.9%), and forested, grasslands, vegetation (15.1%). The impervious surfaces (parking lots, roads, buildings, compacted soil) do not allow rain to infiltrate into the ground. Land management practices of the large amount of residential area in the water shed impacts the lake. Controlling water that runs from the land's surface into the lake is important for drainage lakes.



BLUFF LAKE WATERSHED



Upper Fox River Watershed Landuse
Wisconsin and Illinois



BLUFF LAKE WATERSHED

The Lake Marie drains into Bluff lake through a navigation channel . It also receives water from several storm drains around the lake. A majority of the watershed is located on the north east side of which a majority is agricultural, open space, and residential. The water flows out of Bluff Lake and into Spring Lake where it eventually flows into Petite, Fox, Nippersink, Pistakee and reforms into the Fox River. Bluff Lake has a retention time of 4.9 days, less during a flood event.

WATER CLARITY

TURBID WATERS BECOME WARMER AS SUSPENDED PARTICLES ABSORB HEAT FROM SUNLIGHT, CAUSING OXYGEN LEVELS TO FALL. (WARM WATER HOLDS LESS OXYGEN THAN COOLER WATER.) PHOTOSYNTHESIS DECREASES WITH LESSER LIGHT, RESULTING IN EVEN LOWER OXYGEN LEVELS.

VOLUNTEER LAKE MONITOR PROGRAM

Volunteers measure water clarity using the Secchi disk twice a month May through October. In 2014 there were 48 lakes participating in Lake County.

If you would like more information please contact:

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www.epa.state.il.us/water/vlmp/index.html

Water clarity is an indicator of water quality related to chemical and physical properties. Measurements taken with a Secchi disk indicate the light penetration into a body of water. Algae, microscopic animals, water color, eroded soil, and resuspension of bottom sediment are factors that interfere with light penetration and reduce water transparency. If light penetration is reduced significantly, macrophyte growth may be decreased which would in turn impact the organisms dependent upon them for food and cover. The 2014 average clarity for Bluff Lake was 2.51 feet (ES); this was a 13.4% decrease in the lakes transparency since 2002 (2.9 feet) and the water clarity was slightly above the county median of 2.95 feet. Heavy rains in June and August the day before the Secchi depth was taken may have contributed to the lower readings. The shallowest Secchi depth for Bluff was in September and the deepest was in June at 4.92 feet and 1 foot respectively. Algae blooms are a common occurrence in Bluff Lake and can affect transparency.



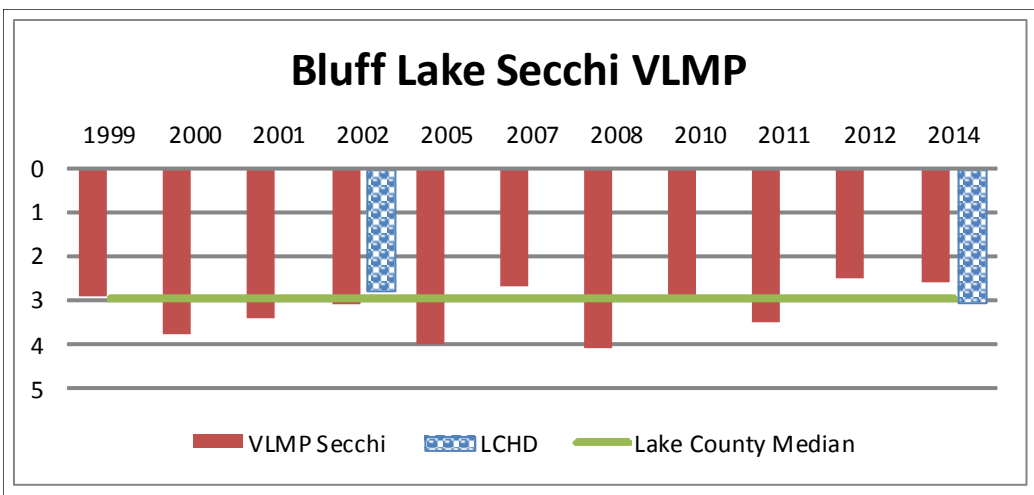
A Secchi disk is an eight-inch diameter weighted metal plate painted black and white in alternating quadrants. A calibrated rope is used to lower the disc into the water and measure the depth to which it is visible.



VLMP —WATER QUALITY

Additional water clarity measurements were taken in Bluff Lake through participation in the Illinois Environmental Protection Agency's (IEPA) Volunteer Lake Monitoring Program (VLMP). Bluff Lake has participated in the program since 1997. Participation in the VLMP program has provided Bluff Lake with annual baseline data that can be used to determine long term water quality trends and support current lake management decision making. The shallowest average VLMP reading was in 2012 and the deepest was in 2008 at 2.52 feet and 4.10 feet respectively. The volunteers on Bluff Lake have provided data that is vital for the management of this lake. If you would like to participate or need more information about becoming a VLMP please contact the LCHD-ES.

Year	VLMP (ft)
1999	2.9
2000	3.8
2001	3.4
2002	3.1
2005	4.0
2007	2.7
2008	4.1
2010	2.9
2011	3.5
2012	2.52
2014	2.62



TOTAL SUSPENDED SOLIDS

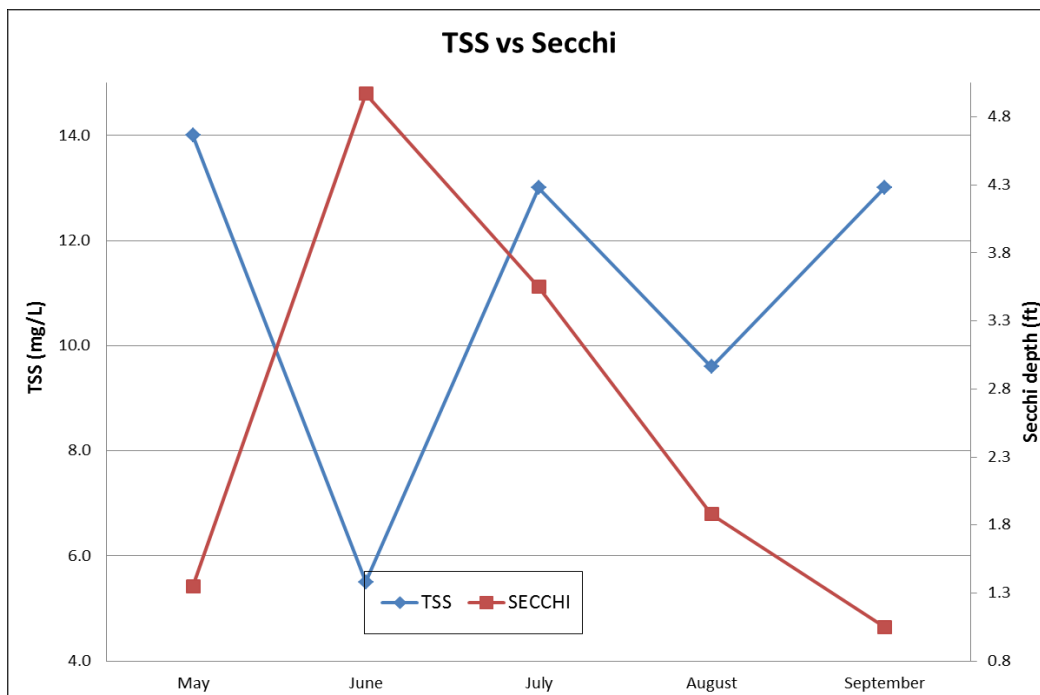
Another measure of water clarity is turbidity, which is caused by particles of matter rather than the dissolved organic compounds. Suspended particles dissipate light, which may limit the depth plants can grow. The total suspended solid (TSS) parameter (turbidity) is composed of nonvolatile suspended compounds (NVSS), non-organic clay or sediment materials, and volatile suspended solids (TVS) (algae and other organic matter).

Seasonal Secchi readings changes are affected by algal growth. The absence or low density of algae in early spring usually provides deeper clarity but as the water warms clarity decreases with more algae present in the water. The 2014 TSS concentrations in Bluff Lake averaged 11.0 mg/L which was above the county median of 8.2 mg/L and 7.8% higher than the 2002 average concentration of 10.2 mg/L. High TSS values are typically correlated with poor water clarity (Secchi disk depth) and can be detrimental to many aspects of the lake ecosystem including the plant and fish communities.

There are internal and external sources of sediment affecting the turbidity in Bluff Lake. Internal sources of sediment suspension include boat traffic, wind and wave, and carp population (Common Carp). Carp are one of the most damaging aquatic invasive species due to their feeding behavior that disrupts shallowly rooted plants, decreasing water clarity. External sources include sediments that are transported into the lake from a feeder creek, bank erosion and other sources in the watershed. Due to the large amount of recreational boaters in this lake, the suspension of sediments during the weekends is at its highest. The average calculated nonvolatile suspended solids (NVSS) was 2.79 mg/L. The low NVSS means that the majority of the TSS concentration in 2014 can be attributed to solids that organic in nature.

The Secchi depths in 2014 were at its shallowest in September (1.0 feet) and the deepest was in July (4.92 feet). The September reading corresponded with the second highest TSS concentration (13.0 mg/L). An algae bloom was observed at the time the sample was taken. The water quality samples were taken on Tuesday or Wednesday, which means that the lake's sediments would have had a chance to settle from the weekend's boating activity.

TSS Total Suspended Solids
TSS are particles of algae or sediment suspended in the water column.
TVS Total Volatile Solids
TVS represents the fraction of total solids that are organic in nature, such as algae cells
NVSS Non-Volatile Suspended Solids
NVSS represents the non-organic clay and sediments that are suspended in the water column.
TDS Total Dissolved Solids
TDS are the amount of dissolved substance such as salts or minerals in the water after evaporation.



DATE (2014)	TSS (mg/L)	SECCHI (ft)
May	14.0	1.30
June	5.5	4.92
July	13.0	3.50
August	9.6	1.83
September	13.0	1.00

WHAT HAS BEEN DONE TO REDUCE PHOSPHORUS LEVELS IN BLUFF LAKE

July 2010- The State of Illinois passed a law to reduce the amount of phosphorus content in dishwashing and laundry detergents.

July 2010- The State of Illinois passed another law restricting the use of lawn fertilizers containing phosphorus by

STORM DRAINS LEAD TO THE NEAREST LAKE, RIVER, POND OR WETLAND. THEY DO NOT GO TO A TREATMENT PLANT.



SALTS DISSOLVE AND MOVE DOWNHILL OR INTO THE NEAREST STORM DRAIN WITH STORM-WATER AND SNOWMELT RUNOFF TO THE NEAREST LAKE, RIVER OR POND. THEY DO NOT SETTLE OUT; THEY REMAIN IN THE WATER CYCLE VIRTUALLY FOREVER.

NUTRIENTS

The nutrients organisms need to live or grow are typically taken in from the environment. In a lake the primary nutrients needed for aquatic plant and algal growth are phosphorus and nitrogen. In most lakes, including Bluff Lake, phosphorus is the limiting nutrient, which means everything that plants and algae need to grow is available in excess: sunlight, warm temperature, and nitrogen.

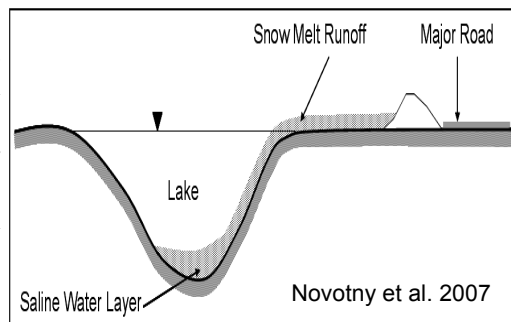
Phosphorus has a direct effect on the amount of plant and algal growth in lakes. The 2014 average total phosphorus epilimnion (near surface sample) concentration in Bluff Lake was 0.112 mg/L, this was an 52.5% increase from the 2002 concentration (0.0734 mg/L). Lakes with concentrations exceeding 0.05 mg/L can support high densities of algae and aquatic plants, which can reduce water clarity and dissolved oxygen levels and are considered impaired by the IEPA. Phosphorus originates from a variety of sources, many of which are related to human activities which include: human and animal waste, soil erosion, septic systems, common carp, and runoff from farmland and lawns.

Nitrogen is the other nutrient critical for algal growth. Total Kjeldahl nitrogen is a measure of organic nitrogen, and is typically bound up in algal and plant cells. The average 2014 TKN for Bluff Lake was 1.90 mg/L. If inorganic nitrogen (NO₂, NO₃, NH₄) concentrations exceed 0.3 mg/L in spring, sufficient nitrogen is available to support summer algae blooms. However, low nitrogen levels do not guarantee less algae blooms. The TN:TP ratio for Bluff Lake was 19:1, which means that the limiting nutrient for aquatic plants was phosphorus.

CONDUCTIVITY AND CHLORIDE

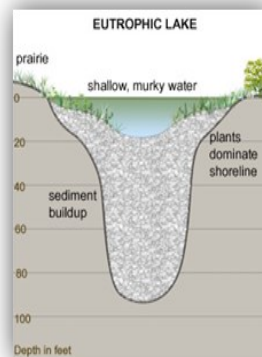
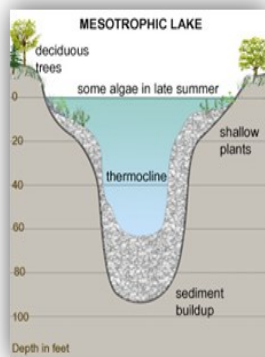
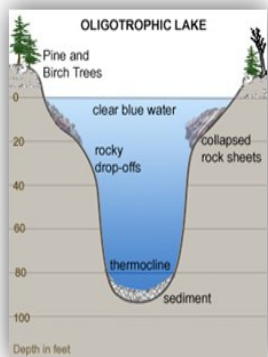
Conductivity is a measure of a water's ability to conduct electricity, measured by the water's ionic activity and content. The higher the concentration of (dissolved) ions the higher the conductivity becomes. Conductivity readings, which are influenced by chloride concentrations, have been increasing throughout the past decade in Lake County. Lakes with residential and/or urban land uses in their watershed often have higher conductivity readings and higher Cl⁻ concentrations because of the use of road salts. Storm water run-off from impervious surfaces such as roads and parking lots can deliver high concentrations of Cl⁻ to nearby water bodies. Road salt used in the winter road maintenance consists of the following ions: sodium chloride, calcium chloride, potassium chloride, magnesium chloride, or ferrocyanides which are detected when chlorides are analyzed.

The 2014 average conductivity for Bluff Lake 0.7597 mS/cm. This parameter was above the county median of 0.7900 mS/cm and which is a 1.4% decrease from the 2002 value of 0.7706 mS/cm. These values are influenced by the winter road maintenance of Route 173, 59 and the surrounding residential areas. The United States Environmental Protection Agency has determined that chloride concentrations higher than 230 mg/L can disrupt aquatic systems and prolonged exposure can harm 10% of aquatic species. Bluff Lake's Cl⁻ concentration was 116 mg/L. Chlorides tend to accumulate within a watershed as these ions do not break down and are not utilized by plants or animals. High chloride concentrations may make it difficult for many of our native species to survive. However, many of our invasive species, such as Eurasian Watermilfoil, Cattail and Common Reed, are tolerant to high chloride concentrations.

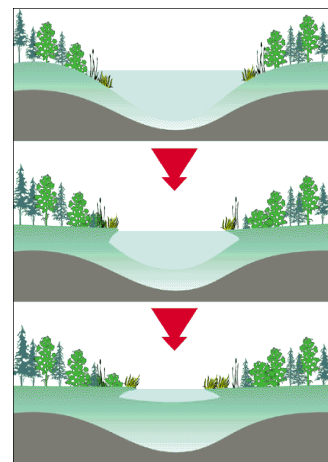


TROPHIC STATE INDEX

Another way to look at phosphorus levels and how they affect lake productivity is to use a Trophic State Index (TSI) based on phosphorus (TSIp). TSIp values are commonly used to classify and compare lake productivity levels (trophic state). A lake's response to additional phosphorus is an accelerated rate of eutrophication. Eutrophication is a natural process where lakes become increasingly enriched with nutrients. Lakes start out with clear water and few aquatic plants and over time become more enriched with nutrients and vegetation until the lake becomes a wetland. This process takes thousands of years to take place. However, human activities on a lake or in the watershed accelerate this process by resulting in rapid soil erosion and heavy phosphorus inputs. This accelerated aging process on a lake is referred to as cultural eutrophication. The TSIp index classifies the lake into one of four categories: oligotrophic (nutrient-poor, biologically unproductive), mesotrophic (intermediate nutrient availability and biological productivity), and eutrophic (nutrient rich, highly productive), or hypereutrophic (extremely nutrient-rich, productive). In 2014, Bluff Lake was hypereutrophic with a TSIp Value of 72.2, placing it 125th out of 171 lakes in the county. Lake Carina was 1st with a 37.4 TSIp Value.



Source: RMB Environmental



"WHEN HUMAN ACTIVITIES ACCELERATE LAKE EUTROPHICATION, IT IS REFERRED TO AS CULTURAL EUTROPHICATION. CULTURAL EUTROPHICATION MAY RESULT FROM SHORELINE EROSION, AGRICULTURAL AND URBAN RUNOFF, WASTEWATER DISCHARGES OR SEPTIC SEEPAGE, AND OTHER NON-POINT SOURCE POLLUTION SOURCES."

LAKE LEVEL

The water level was obtained from the USGS automated staff gauge located in Fox Lake. The lake level was at its lowest in September when the lake was measured at 49.44" which is 6.39" lower than the May level. The lake water level continued to drop from May to September but maintained a summer pool level around 51". Bluff Lake has a large watershed that covers 943 acres in Illinois and 600,046 in Wisconsin, which helps replenish water lost through evaporation during the summer. There are several automated staff gauges located in the Fox Chain O' Lakes watershed in Illinois and Wisconsin. The data provides lake managers a much better idea of lake level fluctuations relative to rainfall events and can aid in future decisions regarding lake level. Staff gauge is a great tool for measuring water level in lakes, rivers, reservoirs. The data collected can be compiled to help understand the natural fluctuations of the lake. Large fluctuations in lake level can lead to shoreline erosion.

2014	Level (in)	Seasonal Change	Monthly change (in)
May	55.83		
June	54.07	1.76	1.76
July	50.41	5.42	3.66
August	51.10	4.73	-0.69
September	49.44	6.39	1.66

THE USGS LINK FOR THE LAKE LEVELS ON THE FOX CHAIN O' LAKES CAN BE FOUND AT THE FOX WATERWAY AGENCY'S WEBSITE.

WWW.FOXWATERWAY.STATE.IL.US/WATERLEVEL.HTM

FLORISTIC QUALITY INDEX

LAKE COUNTY
AVERAGE
FQI = 14.1

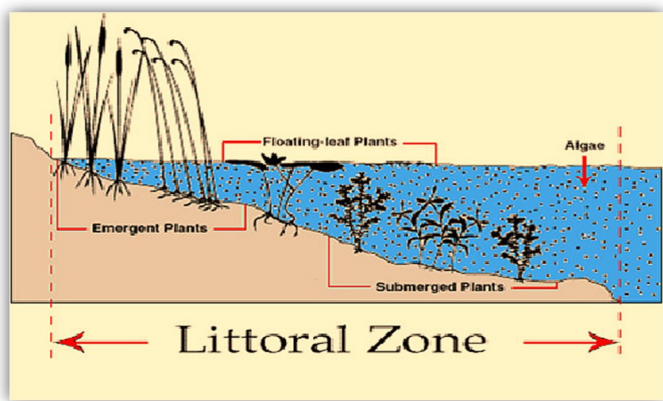
BLUFF LAKE
FQI = 22.2

RANK = 125 /170

AQUATIC PLANTS
SPECIES
OBSERVED = 6

Floristic quality index (FQI; Swink and Wilhelm 1994) is an assessment tool designed to evaluate the closeness that the flora of an area is to that of undisturbed conditions. It can be used to: 1) identify natural areas, 2) compare the quality of different sites or different locations within a single site, 3) monitor long-term floristic trends, and 4) monitor habitat restoration efforts. Each aquatic plant in a lake is assigned a number between 1 and 10 (10 indicating the plant species most sensitive to disturbance). This is done for every floating and submersed plant species found in the lake. These numbers are averaged and multiplied by the square root of the number of species present to calculate an FQI. A high FQI number indicates that there are a large number of sensitive, high quality plant species present in the lake. Non-native species were counted in the FQI calculations for Lake County lakes. In 2014, Bluff had an FQI of 9.1 ranking 125 out of 170 in Lake County. The median FQI of lakes that we have studied from 2000-2014 is 13.4. Cedar Lake is 1st with an FQI of 37.4.

In many lakes macrophytes contribute to the aesthetically pleasing appearance of the setting and are enjoyable in their own right. They are an essential element in the life systems of most lakes.



BATHYMETRIC
MAPS PROVIDE
LAKE
MANAGERS
WITH AN
ACCURATE LAKE
VOLUME THAT
CAN BE USED
FOR HERBICIDE
APPLICATION
AND HELP
ANGLERS FIND
POTENTIAL
FISHING SPOTS.

BATHYMETRIC MAPS

Bathymetric maps, also known as depth contour maps, display the shape and depth of a lake. They are valuable tools for lake managers because they provide information about the surface area and volume of the lake at certain depths.

This information can then be used to determine how much of the lake loses dissolved oxygen in the summer, how much of the lake bottom can be inhabited by plants, and is essential in the application of whole-lake herbicide treatments, harvesting activities and alum treatments of your lake. Other common uses for the map include sedimentation control, fish stocking, and habitat management.

The LCHD-ES collects field data using echo sounder along with a Trimble GPS unit with sub-foot accuracy. Once collected, the data will be analyzed and imported into ArcGIS for further analysis. In ArcGIS, the contours are drawn and the lake volume is calculated. The Lake County-ES has created bathymetric maps for many of the larger lakes in the county.

The LCHD-ES recommends the creation of a bathymetric map for all lakes larger than six acres and can provide the names of several companies that can be hired to do the work. If you are interested in the creation of a bathymetric map of your lake, please contact the LCHD-ES at (847) 377-8030.

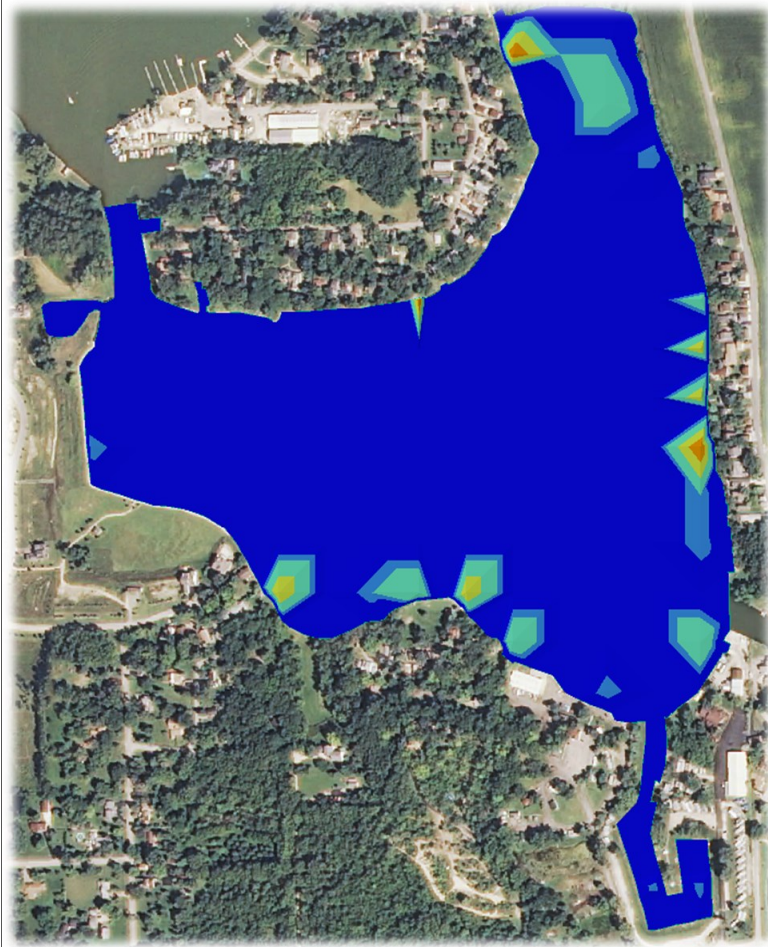
AQUATIC PLANTS

Aquatic plant mapping survey provides information based on the species, density and distribution of plant communities in a particular lake. An aquatic plant sampling was conducted on Bluff Lake on September 2014. There were 108 points generated based on a computer grid system with points 60 meters apart. Aquatic plants occurred at 22 of the sites (20.4% total lake coverage). Eurasian Watermilfoil was found in 14.8% and Curly Leaf Pondweed was present at 8.3% of the sampled locations. There were 6 different plants sampled in 2014 (Coontail, Curly Leaf, Duckweed, Eurasian Watermilfoil, Sago Pondweed, and White Water Lily). The diversity and extent of plant populations can be influenced by a variety of factors. Water clarity and depth are the major limiting factors in determining the maximum depth at which aquatic plants will grow. When light level in the water column falls below 1% of the surface light level, plants can no longer grow. The extent of the 1% light can be obtained by doubling the Secchi disk reading. The average Secchi disk reading for 2014 was 2.51 feet. The deepest aquatic plant, Curly Leaf and Eurasian Watermilfoil, was found in 5 feet of water. Aquatic plants play an important role in the lakes ecosystem by providing habitat for fish and shelter for aquatic organism. Plants provide oxygen, reduce nutrients such as phosphorus to prevent algae bloom, and help stabilize sediment. A native plant community tends to be diverse and usually does not impede lake activities such as boating, swimming and fishing. Non-native plants often crowd out native plants by growing earlier in the year or by forming canopies that block sunlight.

Heavy boat traffic on the main part of the lake and wind-wave activity stirs up bottom sediment blocking sunlight need by aquatic plants to grow. Vertical seawalls reflect wave energy, which can cause scouring of the lake bottom, preventing aquatic plants from establishing near shore. Re-facing a vertical seawall with stone, or native plants planted in front of the seawall helps absorb wave energy and stabilize lake sediment.

Due to the low abundance of native species found in the Fox Chain 'O' Lakes, management decisions should include plans that would stimulate the growth of native vegetation as well as invasive species control.

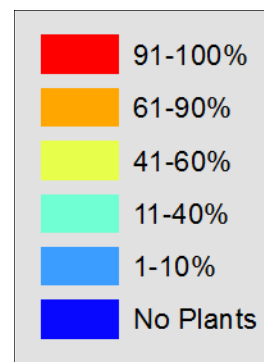
AQUATIC PLANT MAP FOR AUGUST 2014



Rake Density (coverage)	# of Sites	% of Sites
No Plants	86	79.6
>0-10%	10	9.3
10-40%	5	4.6
40-60%	4	3.7
60-90%	3	2.8
>90%	0	0
Total Sites with Plants	22	20.4
Total # of Sites	108	100



LCHD Staff identifying plants during sampling.





PESTICIDE PERMIT REQUIREMENTS FOR PESTICIDE APPLICATION

A National Pesticide Elimination System (NPDES) permit is required when pesticides are applied to, over or near the waters of the State. This permit applies to all public waters that have an out-flow to the State waters. A Notice of Intent (NOI) must be filled and submitted electronically to the Illinois Environmental Protection Agency (IEPA) at least 14 days prior to any application of pesticides. In addition to the NPDES, the application of herbicides into waters of the Fox Chain O' Lakes requires a permit by the Illinois Department of Natural Resources (IDNR) per Administrative Code, Part 895. In order to obtain the permit an application needs to be filed with the IDNR requesting a permit for pesticide application, the application can be filled out by the applicant or their representative (which is usually the pesticide consultant).



**FOR FULL
DETAILS OF THE
RULE SEE:**

**[HTTP: //
WWW.EPA.STAT
E.IL.US/WATER/
PERMITS/
PESTICIDE/
INDEX.HTML](http://www.epa.state.il.us/water/permits/pesticide/index.html)**

AND

**[HTTP://
WWW.FOXWATERW
AY.COM/
PDFATTACHMENTS/
HERBICIDE.PDF](http://www.foxwaterway.com/pdf/attachments/herbicide.pdf)**

- When is a NPDES permit needed?

Prior to any pesticide application made directly to, over or near waters of the state.

- Who should obtain NPDES permit coverage?

The individual pond owner who will apply the herbicide. If the pond owner hires a contract applicator either the contract applicator or the pond owner could apply for NPDES coverage.

- How do I apply for NPDES permit coverage?

File a Notice of Intent (NOI) with the IEPA. The form can be printed from the site listed above. Don't forget the 14 day public notice period and the information regarding the approval and notification process listed above, so plan ahead

- What does the permit cost?

Currently there is no fee however fees may be introduced at a later date.

- How long is the permit good for?

Five years from the date of issuance but not from the date of coverage.

- Is anything else needed besides the permit?

An Adverse Incident Report is needed if there are any adverse impacts related to the application such as spills or accidental overdosing. The incident must be reported to the Illinois Emergency Management Agency immediately and the report must follow within 15 days.

A Pesticide Discharge Management Plan (PDMP) is required if the annual threshold of 80 acres is past and if you do not meet any of the additional exemptions within the permit. The threshold is determined not only by the size of the pond or lake but by the number of treatments. For example, if a 10 acre pond is treated 9 times with different herbicides within a one-year period, it would be counted as 90 treatment acres and the 80 acre threshold limit would have been passed. This would trigger the need for a PDMP. If treated with the same herbicide 9 times, the additional treatments would not count toward the threshold.

- Additional things to remember

You are allowed to apply only a pesticide that is labeled for aquatic use. The General NPDES permit only applies to pesticide applications that will be made directly to or over waters of the State or at water's edge. Pesticide applications to dry ditches which discharge into waters of the State may also require General NPDES permit coverage.

You must file an updated NOI to modify your NPDES permit coverage to add additional use patterns or treatment areas at least 14 days prior to beginning the pesticide applications. The General NPDES permit coverage is good for 5 years from the issuance date on the permit.

Excerpt : Illinois Department of Natural Resources

SHORELINE EROSION

Erosion is a natural process primarily caused by water which results in the loss of material from the shoreline. Disturbed shorelines caused by human activity such as clearing of vegetation and beach rocks, and increasing runoff will accelerate erosion. Rain and melting snow and wave action are the main causes of erosion. Rain can loosen soil and wash it down gradient towards the lake. Creating a native plant buffer helps prevent soil erosion as well as filter out pollutants and unwanted nutrients from entering the lake. Native plants can be planted along the shoreline since plant roots hold the soil particles in place so they are not easily washed away during a rain event, melting snow or wave action. Loose rocks and gravel placed on top of a filter fabric prevents soil from washing away before newly planted seed and vegetation has a chance to grow. Eroded materials cause turbidity, sedimentation, nutrients, and pollutants to enter a lake. Shore line buffer zone planted with native vegetation not only reduces runoff by increasing water infiltration into the ground, it also offers food and habitat for wildlife. Less runoff means less nutrients, sediments and other pollutants entering the lakes and streams. Excess nutrients are the primary cause of algal blooms and increased aquatic plant growth. Once in the lake, sediments, nutrients and pollutants are harder and more expensive to remove.

Vertical seawalls reflect wave energy, which can cause scouring of the lakebed, increased turbidity and habitat loss for lake organisms. This can make it difficult for aquatic plants to grow, near the seawall edge. A significant portion of the shoreline in the Fox Chain'O'Lakes is vertical seawall and may contribute to poor plant coverage near shore.



This minimizes the negative effects of an inflexible vertical seawall. Permits may be required with local or state government agencies prior to any alteration or repair of shoreline.

“VEGETATIVE BUFFER ZONES CAN PLAY A KEY ROLE IN LIMITING NEGATIVE WATER QUALITY IMPACTS FROM DEVELOPED SHORELAND PROPERTY”



PLANTS HELP STABILIZE THE SHORELINE FROM BEING WASHED AWAY DURING A RAIN EVENT OR WIND AND WAVE ACTION.

Stone re-facing is adding layers of stone in front of an existing seawall to create a more natural shoreline. The stones help absorb wave energy that would otherwise reflect back and scour the bottom of the lake. This provides excellent habitat for fish, turtles and other aquatic animals.

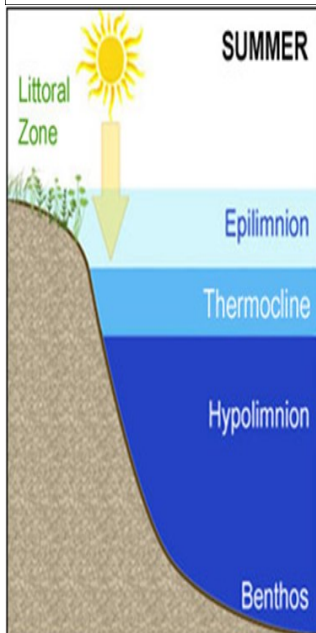
INFORMATION ON SHORELINE REGULATION AND PERMITS CAN BE FOUND ON THE ILLINOIS DEPARTMENT OF NATURAL RESOURCES' WEBSITE.

[HTTP://WWW.DNR.ILLINOIS.GOV/WATERRESOURCES/DOCUMENTS/3704.PDF](http://WWW.DNR.ILLINOIS.GOV/WATERRESOURCES/DOCUMENTS/3704.PDF)

DISSOLVED OXYGEN

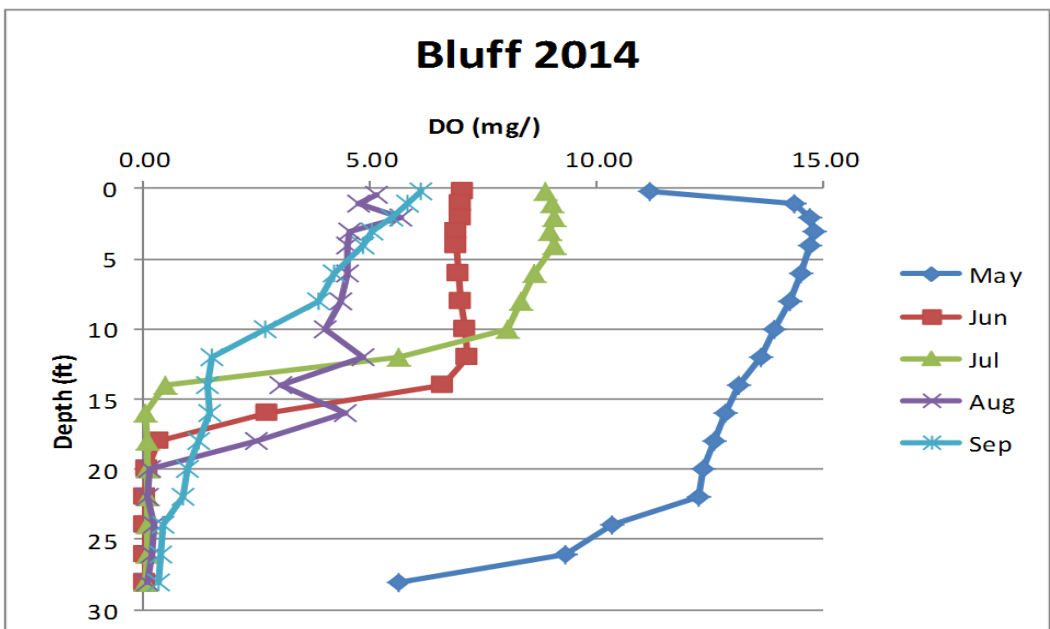
RANGE OF TOLERANCE FOR DISSOLVED OXYGEN IN FISH PARTS PER MILLION (PPM) DISSOLVED OXYGEN	
1	
2	<3.0 PPM too low for fish populations
3	
4	3.0-5.0 PPM 12-24 Hour range of tolerance / stressful conditions
5	
6	>6.0 PPM Supports Spawning
7	
8	>7.0 PPM Supports Growth and Activity
9	
10	>9.0 PPM Supports abundant fish populations

OXYGEN IS VITAL TO THE HEALTH OF AQUATIC HABITATS. PLANTS AND ANIMALS NEED OXYGEN TO SURVIVE. A LOW LEVEL OF OXYGEN IN THE WATER IS A SIGN THAT THE HABITAT IS STRESSED OR POLLUTED.



Dissolved oxygen (DO) is a major indicator of water quality and is important for aquatic organisms, algae, macrophytes, and for many chemical reactions to occur that are crucial for lake functions. Dissolved oxygen concentrations can have large variations occurring and are affected by diffusion, aeration, photosynthesis, respiration, and decomposition. Temperature, salinity and pressure changes will also cause DO to fluctuate. Dissolved oxygen will vary both seasonally and by depth throughout the water column in lakes. If dissolved oxygen concentrations drop below levels necessary for sustaining aquatic life (below 5.0 mg/L at 1 foot depth below the lake surface) it becomes a water quality impairment. Low dissolved oxygen primarily is a result of excessive nutrients that stimulate growth of organic matter, such as algae, or the increase of pollutants such as sewage, lawn clippings, and soils that are considered to be “oxygen-demanding”. Low dissolved oxygen levels is also often a factor for fish kills. When many of the plants or algae die at the end of the growing season, their decomposition can significantly reduce DO concentrations. In deeper, thermally stratified lakes, oxygen production is greatest in the upper water layer (epilimnion) where sunlight drives photosynthesis and oxygen consumption is greatest near the bottom of the lake (hypolimnion) where organic matter accumulates and decomposes.

Bluff Lake is the only lake in the Fox Chain that is considered impaired for dissolved oxygen. Bluff Lake’s dissolved oxygen concentrations were recorded as 4.73 mg/L at 1 depth below the lake surface on the August sampling date which qualifies as a DO impairment. Petite and Marie, lakes near Bluff lake and sampled on the same day, also had low dissolved oxygen levels. A precipitation event that occurred on 8/11 – 8/12 with approximately 1.94” of rain may have contributed to the decrease in DO on this sampling date. Stormwater from the precipitation events carry oxygen-demanding substances. Sources of oxygen-demanding substances vary from natural (animal waste, decaying vegetation) or human-related sources (oils, greases, grass clippings, pet waste). A heavy precipitation event like the one that occurred in August could send a large pulse of these substances into the lake, reducing dissolved oxygen. Since the LCHD-ES was monitoring the day after the storm, the decreased DO levels could be a result of this precipitation event.



SWIMMING BEACH MONITORING

All licensed inland beaches are tested bi-weekly from May to September by the Lake County Health Department's Ecological Services Department. The water samples are tested for *E. coli* bacteria, which are found in the intestines of almost all warm-blooded animals. *E. coli* is used as an indicator organism, meaning that high concentrations of *E. coli* might suggest the presence of harmful pathogens such as, *Salmonella*, *Giardia*, etc. While not all strains of *E. coli* are the same, certain strains can make humans sick if ingested in high enough concentrations. If water samples come back high for *E. coli* (>235 *E. coli*/100 ml), LCHD informs the management body for the bathing beach that the beach is closed and a sign is posted indicating the beach closure. Bluff Lake Lodges and Chain O' Lakes Park Association are the two licensed beaches in Bluff Lake.

There were 13 licensed beaches sampled on the Fox Chain O' Lakes in 2014. These lakes were divided into the North and South group of lakes. During the summer of 2014, there were three beaches that exceeded 235 *E. coli*/100 ml. out of the 13 beaches samples. Highland Beach, located on a channel between Spring and Petite Lake, exceeded the limit sixteen times between June 13, 2014 and August 1, 2014. There was stagnant water due to little or no current flowing between the lakes, along with the constant presence of waterfowl observed at the beach. Stanton Bay (Fox Lake) and Vacation Village (Dunns Lake) each had one sample that exceed the maximum allowable limit.



HOW TO PREVENT ILLNESS AND BEACH CLOSURE

- If you are sick, do NOT swim.
- Do NOT drink the water while swimming.
- Avoid swimming during heavy algae blooms.
- Keep pets off the beach.
- Do not feed water fowl in or around the beach area.
- Children who are not toilet trained should wear tight-fitting rubber or plastic pants.
- Take a shower before entering the water, and have kids take frequent bathroom breaks.
- Wash your hands after exiting the lake.
- Identify sources of pollution near the beach (ex: failing septic, stagnant water, creeks and storm drains).



PROTECT YOUR WATERS

- Remove all plants, mud, fish, or animals before transporting equipment.
- Eliminate all water from equipment before transporting equipment.
- Dry anything that comes in contact with water (boat, trailers, equipment, clothing, etc.).
- Remove all mud and dirt since it might contain aquatic hitchhikers.
- Never release plants, fish or animals into a body of water unless they came out of that body of water.
- Do not release bait into the waters you are fishing.
- Do not release aquarium fish or aquatic pets in to the lake.



ECOLOGICAL SERVICES

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For more information visit us at:

**[http://www.lakecountyl.gov/
Health/want/
BeachLakeInfo.htm](http://www.lakecountyl.gov/Health/want/BeachLakeInfo.htm)**

Protecting the quality of our lakes is an increasing concern of Lake County residents. Each lake is a valuable resource that must be properly managed if it is to be enjoyed by future generations. To assist with this endeavor, Population Health Environmental Services provides technical expertise essential to the management and protection of Lake County surface waters.

Ecological Service's goal is to monitor the quality of the county's surface water in order to:

- Maintain or improve water quality and alleviate nuisance conditions
- Promote healthy and safe lake conditions
- Protect and improve ecological diversity

Services provided are either of a technical or educational nature and are provided by a professional staff of scientists to government agencies (county, township and municipal), lake property owners' associations and private individuals on all bodies of water within Lake County.

LAKE RECOMMENDATIONS

Bluff Lake's water quality had declined since 2002 with an increase in total phosphorus (TP) and decrease in water clarity. The total suspended solids (TSS) decreased only slightly. There was also a decrease in plant density and diversity. Bluff Lake management is administered by the Illinois DNR and the Fox Waterway Agency.

To improve the overall quality of Bluff Lake, ES (Ecological Services) has the following recommendations:

- Encourage homeowners to incorporate native plants in their landscaping through rain gardens or shoreline filter strips
- Stone refacing of vertical seawalls
- Create an aquatic plant management program that would restore plant diversity and density
- Participation in Volunteer Lake Monitoring Program
- Participate in the Clean Waters Clean Boats Program
- Assess current fish population
- Reduce or eradicate common carp
- Help reduce Cl⁻ by supporting wise use of road salt in the watershed
- Maintain septic system and pump out septic tanks at least once a year

